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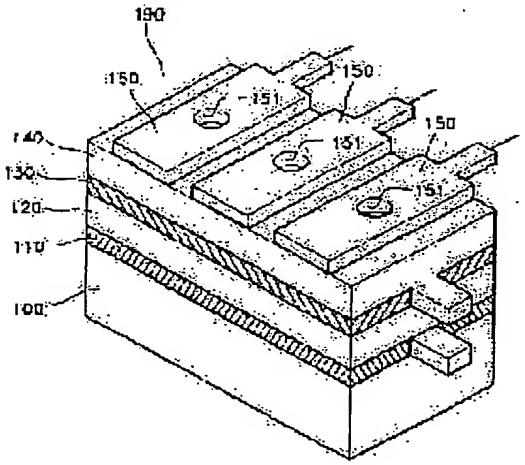
54) CATHODE STRUCTURE USING FERRO-DIELECTRIC EMITTER AND ELECTRON GUN AND CATHODE-RAY TUBE USING CATHODE STRUCTURE

57)Abstract:

PROBLEM TO BE SOLVED: To facilitate fabrication, simplify the tructure, and lessen deterioration of the cathode substance resulting om ion bombardment even in the low vacuum state.

OLUTION: A cathode structure concerned comprises a substrate 00, lower electrode layer 110 formed on the substrate 100, a ferro-ielectric cathode layer 120 with a ferro-dielectric emitter formed on ıe lower electrode layer 110, an upper electrode layer 130 to provide n electron emission region from the surface of the cathode layer 120, ıd a drive electrode layer 150 which is formed on the electrode layer 30 and controls electrons emitted from the electron emission region the upper electrode layer 130. Accordingly the deterioration of the athode substance due to ion bombardment can be lessened even in e low vacuum state.



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(54)【発明の名称】　強誘電性エミッターを適用した陰極構造体及びこれを適用した電子銃並びに陰極線管

(57)【特許請求の範囲】

【請求項１】　基板と、

基板上に形成される下部電極層と、

前記下部電極層上に形成される強誘電性エミッターを適用した陰極層と、

前記強誘電性陰極層上に形成され、強誘電性陰極層表面からの電子放出領域を供する上部電極層と、

前記電極層上に形成されて前記上部電極層の電子放出領域から放出される電子を制御する３つの駆動電極とを具備し、

前記各駆動電極は電子が通過する貫通孔をそれぞれ有し、

前記駆動電極に対応する前記上部電極の部位には各貫通孔に対応する多数の微細孔が形成されていることを特徴とする強誘電性エミッターを適用した陰極構造体。

【請求項２】　前記貫通孔の直径は300 マイクロメートル以下であることを特徴とする請求項１に記載の強誘電性エミッターを適用した陰極構造体。

【請求項３】　前記強誘電性陰極層の素材はPZT 又はPLZTであることを特徴とする請求項１に記載の強誘電性エミッターを適用した陰極構造体。

【請求項４】　前記強誘電性陰極層の素材はPZT 又はPLZTであることを特徴とする請求項２に記載の強誘電性エミッターを適用した陰極構造体。

【請求項５】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100 マイクロメートル内の範囲であることを特徴とする請求項１に記載の強誘電性エミッターを適用した陰極構造体。

【請求項６】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100 マイクロメートル内の範囲であること

を特徴とする請求項２に記載の強誘電性エミッターを適用した陰極構造体。

【請求項７】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100 マイクロメートル内の範囲であることを特徴とする請求項３に記載の強誘電性エミッターを適用した陰極構造体。

【請求項８】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100 マイクロメートル内の範囲であることを特徴とする請求項４に記載の強誘電性エミッターを適用した陰極構造体。

【請求項９】　請求項１に記載の陰極構造体と、
前記電子放出源からの電子を制御及び加速する多数の電極を具備する電極群と、
前記電子放出源と前記電極群を支持かつ固定する支持手段と、
を具備することを特徴とする電子銃。

【請求項１０】　前記貫通孔の直径は300 マイクロメートル以下であることを特徴とする請求項９に記載の電子銃。

【請求項１１】　前記強誘電性陰極層の素材はPZT 又はPLZTであることを特徴とする請求項９に記載の電子銃。

【請求項１２】　前記強誘電性陰極層の素材はPZT 又はPLZTであることを特徴とする請求項１０に記載の電子銃。

【請求項１３】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100マイクロメートル内の範囲であることを特徴とする請求項９に記載の電子銃。

【請求項１４】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100マイクロメートル内の範囲であることを特徴とする請求項１０に記載の電子銃。

【請求項１５】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100マイクロメートル内の範囲であることを特徴とする請求項１１に記載の電子銃。

【請求項１６】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100マイクロメートル内の範囲であることを特徴とする請求項１２に記載の電子銃。

【請求項１７】　請求項９に記載の電子放出源と多数の電極を具備した電子銃と、
前記電子銃の装着されるネック部を具備するファンネルと、
前記電子銃からの電子ビームにより画像を実現するスクリーンを具備したパネルと、
を具備することを特徴とする陰極線管。

【請求項１８】　前記貫通孔の直径は300 マイクロメートル以下であることを特徴とする請求項１７に記載の陰極線管。

【請求項１９】　前記強誘電性陰極層の素材はPZT 又はPLZTであることを特徴とする請求項１７に記載の陰極線管。

【請求項２０】　前記強誘電性陰極層の素材はPZT 又はPLZTであることを特徴とする請求項１８に記載の陰極線管。

【請求項２１】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100マイクロメートル内の範囲であることを特徴とする請求項１７に記載の陰極線管。

【請求項２２】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100マイクロメートル内の範囲であることを特徴とする請求項１８に記載の陰極線管。

【請求項２３】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100マイクロメートル内の範囲であることを特徴とする請求項１９に記載の陰極線管。

【請求項２４】　前記強誘電性陰極層の厚さは1 マイクロメートル乃至100マイクロメートル内の範囲であることを特徴とする請求項２０に記載の陰極線管。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は強誘電性エミッターを適用した陰極構造体及びこれを適用した電子銃及び陰極線管に係り、特に電子放出源として強誘電性エミッターを使用する強誘電性エミッターを適用した陰極構造体及びこれを適用した電子銃並びに陰極線管に関する。

【０００２】

【従来の技術】一般に陰極線管に用いられる陰極構造体は熱的に励起されたBa酸化物のような陰極物質から電子を放出する。このような陰極構造体は陰極物質を加熱するための熱源、例えばフィラメントを備えており、フィラメントによる陰極物質の加熱方式により直熱型と放熱型とに分けられる。

【０００３】電子銃から放出された熱電子が活発にスクリーンに進み、かつイオン衝撃による陰極物質の劣化を防止するためには、陰極線管の内部が高真空の状態を保たなければならない。

【０００４】一般に陰極線管の製造過程では陰極物質から熱電子が円滑に放出されるように、いわゆる排気工程及びエージング工程などの一連の製造過程を経る。

【０００５】しかし、従来では、排気及びエージング工程に相当の時間がかかるうえ、工程中に発生するイオン衝撃により陰極物質が劣化するなどの問題点があった。

【０００６】

【発明が解決しようとする課題】本発明は前記のような従来の問題点を解決するためになされたものであり、低真空の状態下でもイオン衝撃による陰極物質の劣化が少ない強誘電性エミッターを適用した陰極構造体及びこれを適用した電子銃並びに陰極線管を提供することにその目的がある。

【０００７】また、本発明の他の目的は、製作が容易で、構造が簡単な強誘電性エミッターを適用した陰極構造体及びこれを適用した電子銃及び陰極線管を提供することである。

【０００８】

【課題を解決するための手段】前記の目的を達成するために、本発明による陰極構造体は、基板と、基板上に形成される下部電極層と、前記下部電極層上に形成される強誘電性エミッターを適用した陰極層と、前記強誘電性陰極層上に形成され、強誘電性陰極層表面からの電子放出領域を供する上部電極層と、前記電極層上に形成されて前記上部電極層の電子放出領域から放出される電子を制御する３つの駆動電極とを具備し、前記各駆動電極は電子が通過する貫通孔をそれぞれ有し、前記駆動電極に対応する前記上部電極の部位には各貫通孔に対応する多数の微細孔が形成されていることを特徴とする。

【０００９】また、前記目的を達成するために、本発明による電子銃は、前記陰極構造体と、前記電子放出源からの電子を制御及び加速する多数の電極を具備する電極群と、前記電子放出源と前記電極群を支持かつ固定する支持手段とを具備することを特徴とする。

【００１０】また、前記目的を達成するために、本発明による陰極線管は、前記電子銃と、前記電子銃の装着されるネック部を具備するファンネルと、前記電子銃からの電子ビームにより画像を実現するスクリーンを具備したパネルとを具備することを特徴とする。

【００１１】前記本発明において、前記電子放出領域を３つ設けてカラー画像実現のための３つの電子ビームを得ることが望ましく、特に前記駆動電極に電子が通過する通過孔を設けることが望ましい。

【００１２】また、前記強誘電性陰極の素材としてはPZT 又はPLZTのうち何れか一つを適用することが望ましい。

【００１３】

【発明の実施の形態】以下、本発明を添付した図面に基づき更に詳細に説明する。

【００１４】本発明の陰極構造体の基本概念を説明するための図１を参照すると、120 は電子放出源の強誘電性陰極層であり、110 と130 は強誘電性陰極層を励起させるための上下電極層である。

【００１５】下部電極層110 と上部電極層130 にサブマイクロ秒の高圧パルスを印加すると、強誘電性陰極層120 の内部及び表面に自発分極をスイッチするようになり、強い電子の放出が招かれる。ここで、電子は上部電極の形成されていない露出部位から放出される。

【００１６】具体化された本発明による陰極構造体の概略的な斜視図を示す図２および図２の断面図を示す図３を参照すると、基板100 の表面に最下位の下部電極層110 が形成され、その上に強誘電性エミッターを適用した陰極層120 、上部電極層130、絶縁層140 、駆動電極層150 が順次に形成されている。

【００１７】前記のような構造の陰極構造体は、カラー陰極線管に用いられるように３つの電子放出領域を有する。具体的に、前記上部電極層130 と下部電極層110 はそれぞれ一つずつ設けられて強誘電性陰極層120 全体を

励起させ得るようになっている。

【００１８】前記絶縁層140 の上には３つの駆動電極層150 が一定間隔を隔てて設けられている。そして、各駆動電極層150 には電子放出及び制御のための貫通孔151 が形成されている。ここで、前記各駆動電極層150 の各貫通孔151 に対応する前記上部電極層130 の部位には、図４に示すように、熱電子の放出のための微細孔131が形成されているため、これを通じて電子が前記駆動電極層150 の貫通孔151 へと進むようになっている。

【００１９】前記駆動電極層150 は画像信号などの制御信号を受け取り、電子を放出するか否かを決定し、かつ電子放出量を制御する。

【００２０】かかる構造の本発明の陰極構造体において、前記強誘電性陰極層120 の素材としては、強誘電性物質として公知のPZT 、PLZTなどが用いられる。また、前記上部電極層130 及び下部電極層110 の素材としては、アルミニウム、金、白金などの高電導性金属が用いられる。

【００２１】また、実験の結果、前記強誘電性陰極層120 から電子を放出させるための駆動電圧は100 ボルト以下の低いパルス電位を有する場合には、電流の漏れが少なく安定的な電子放出が起こるということが分かった。特に、駆動電圧は強誘電性陰極層の材料状態、例えば材料の結晶相や厚さなどに依存する。実験によると、駆動パルスの電圧を100 ボルト以下に下げるために強誘電性陰極層120 、例えばPLZTの厚さ、即ち上下電極層130,110 間の間隔を10マイクロメートル以下に設定する必要がある。

【００２２】駆動電圧は陰極層が薄ければ薄いほど低くなるが、約１マイクロメートル以下になると上下電極層間の短絡が発生するので、１マイクロメートル以上にならなければならない。また、駆動電圧は電子放出領域の大きさ、即ち駆動電極層に形成された貫通孔の直径にも依存する。実験によると、300 マイクロメートル以下にしてから漸く100 ボルト以下の状態で安定的な電子放出が可能になった。

【００２３】前記のような構造の本発明の陰極構造体の製作方法は次の通りである。

【００２４】図５に示されたように、結晶化ガラスからなる基板100 の表面に、まず金ペーストを印刷法にて形成した後、所定時間だけ塑性化させて下部電極層110 を得る。

【００２５】下部電極層110 が完成されると、図６に示されたように、ペースト化されたPZT 又はPLZTを20マイクロメートルの厚さで印刷法にて形成し、再び塑性過程を経て強誘電性陰極層120 を形成する。

【００２６】図７に示されたように、前記強誘電性陰極層120 上に金ペーストを印刷法にて積層し、これを塑性して上部電極層130 を形成する。この際、上部電極層130 は図４に示されたようなパターン、即ち多数の微細孔

131 を有する。

【００２７】図８に示されたように、印刷法を用いて絶縁層１４０及び駆動電極層１５０を形成すると、所望の陰極構造体が得られる。ここで、前記絶縁層140 と駆動電極層150 は前記上部電極層130 の微細孔131 に対応する貫通孔を有する。

【００２８】また、本発明による陰極構造体を製作するために、前述した印刷法以外の方法を用いることもできる。例えば、電極層の形成において、スパッタリング法、ドクター・ブレード法などを適用することもでき、強誘電性陰極層を形成するためにはバルク状に強誘電性シートを製作してから、この一側面に電極層をコーティングした後、これをアクリル樹脂にてモールディングし、他面を所定の厚さでポリシングした後、基板に付着させる。

【００２９】図９は本発明の陰極構造体が適用された本発明の電子銃の概略的な側面構造を示したものである。

【００３０】この電子銃900 は一つの主レンズを有し、かつ前述したような陰極構造体190と、制御電極G1と、スクリーン電極G2と、フォーカス電極G3及び加速電極G4とが順番に並んでおり、これらはガラスビード800 により一つに結合されている。820 は本発明の陰極構造体を前記ガラスビード800 に固定させるための固定片であり、このような固定片は多様な形態に変更できる。

【００３１】前述したように、本発明による電子銃は単一の主レンズを有する単電子銃の構造において、熱電子放出源の放熱型陰極構造体が本発明の陰極構造体に取り替えられた構造を有する。

【００３２】図１０は前述した本発明の電子銃を具備した本発明による陰極線管を概略的に示した図面であり、既存構造の陰極線管において、従来の構造の電子銃が本発明の電子銃900 に取り替わった構造を有する。

【００３３】全体的な構造は、電子銃900 が内蔵され、その外周に偏向ヨーク320 が設けられるネック310 を有するファンネル300 と、内側面にスクリーン410 の形成されたパネル400 とが相互結合されて一つの真空容器が構成される。前記パネル400のスクリーン410 から所定距離離隔された位置にはシャドーマスク420 と内側シールド440 が設けられており、これらはパネル400 に固定されているフレーム430 で支持されている。

【００３４】前記のような構造を有する本発明の陰極線管の組立が終了したら、陰極構造体を最適化するための排気及びエージング工程を経るようになるが、従来の陰極構造体を適用した陰極線管の場合には約４時間がかかるのに対して、本発明による陰極線管の場合にはたった２時間内に排気及びエージング工程が終了した。また、実験によると、排気時の真空度を従来の陰極線管より一段階程度下げても陰極構造体が損なわれなかった。

【００３５】

【発明の効果】本発明による陰極線管は強誘電性陰極層を適用することにより、排気及びエージング工程が技術的に単純化され、従って低コストとなる。その上に、フィラメントのような熱源を使用しないために部品のコストが下がり、特に熱源による陰極構造体とこれに隣接した要素の熱的変形を抑制することができる。また、電子放出方法が瞬間的なパルスにより行われるので、熱電子の放出がすばやく行われる。

【図面の簡単な説明】

【図１】本発明による陰極構造体を概略的に示した図。

【図２】本発明による陰極構造体を概略的に示した斜視図。

【図３】図２に示された本発明による陰極構造体の断面図。

【図４】図２に示された本発明による陰極構造体の上部電極の一部拡大平面図。

【図５】本発明による陰極構造体の制作工程図。

【図６】本発明による陰極構造体の制作工程図。

【図７】本発明による陰極構造体の制作工程図。

【図８】本発明による陰極構造体の制作工程図。

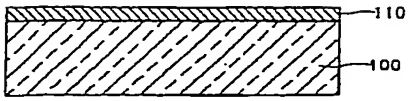
【図９】本発明の陰極構造体が適用された本発明による電子銃の一実施例を示した概略断面図。

【図１０】本発明の電子銃が適用された本発明による陰極線管の概略断面図。

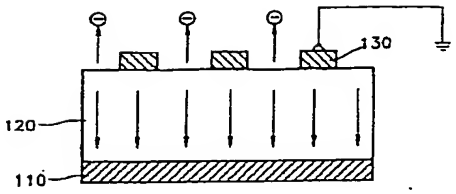
【符号の説明】

100　基板
110　下部電極
120　強誘電性陰極層
130　上部電極
131　微細孔
140　絶縁層
150　駆動電極層
151　貫通孔
190　陰極構造体
300　ファンネル
310　ネック
320　偏向ヨーク
400　パネル
410　スクリーン
420　シャドーマスク
430　フレーム
440　内側シールド
800　ガラスビード
820　固定片
900　電子銃
G1　制御電極
G2　スクリーン電極
G3　フォーカス電極
G4　加速電極

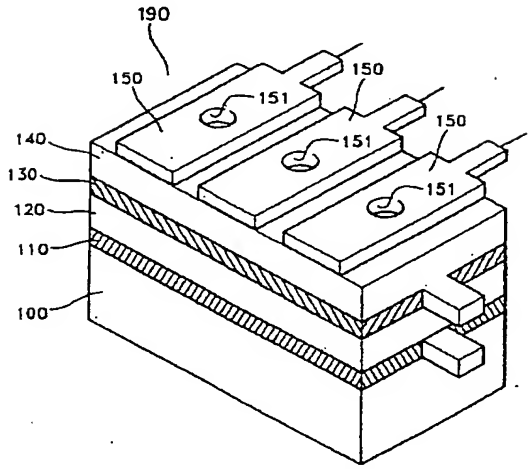
【図５】



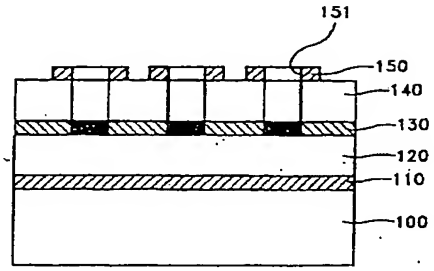
【図１】



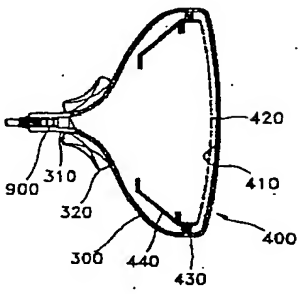
【図２】



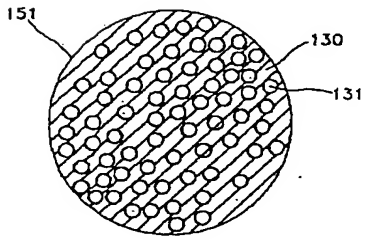
【図３】



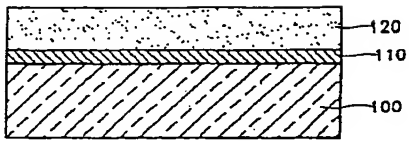
【図１０】



【図４】

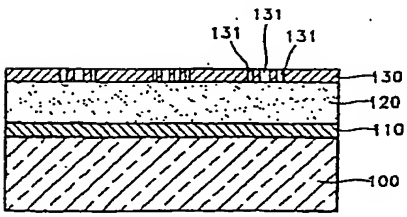


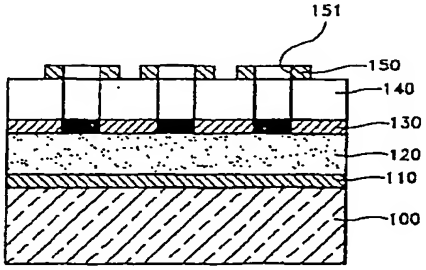
【図６】



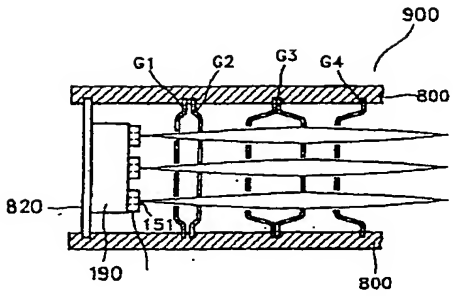
【図８】

【図７】





【図９】



フロントページの続き

(56)参考文献　特開　平５－325777（ＪＰ，Ａ）
特開　平６－283092（ＪＰ，Ａ）
特開　平８－203418（ＪＰ，Ａ）

(58)調査した分野(Int.Cl.7，ＤＢ名)
H01J　1/30
H01J　29/50

NOTICES *

. This document has been translated by computer.So the translation may not reflect the original precisely.
. **** shows the word which can not be translated.
.In the drawings, any words are not translated.

LAIMS

Claim(s)]
Claim 1] The cathode structure which is characterized by providing the following and which applied the
rroelectricity emitter. Substrate. The lower electrode layer formed on a substrate. The catholyte which applied the
rroelectricity emitter formed on the aforementioned lower electrode layer. The drive electrode which controls the
ectron which is formed on the aforementioned ferroelectricity catholyte, is formed on the up electrode layer which
ffers the electron emission field from a ferroelectricity catholyte front face, and the aforementioned electrode layer,
id is emitted from the electron emission field of the aforementioned up electrode layer.
Claim 2] It is the cathode structure which applied the ferroelectricity emitter according to claim 1 characterized by for
ie aforementioned drive electrode consisting of three drive electrodes, and for each drive electrode having the
reakthrough which an electron passes, respectively, and forming the micropore of a large number corresponding to
ach breakthrough in the part of the aforementioned up electrode corresponding to the aforementioned drive electrode.
Claim 3] The diameter of the aforementioned breakthrough is 300. The cathode structure which applied the
rroelectricity emitter according to claim 2 characterized by being below MAIKUROMETORU.
Claim 4] The material of the aforementioned ferroelectricity catholyte is PZT. Or the cathode structure which applied
ie ferroelectricity emitter according to claim 1 characterized by being PLZT.
Claim 5] The material of the aforementioned ferroelectricity catholyte is PZT. Or the cathode structure which applied
ie ferroelectricity emitter according to claim 2 characterized by being PLZT.
Claim 6] The material of the aforementioned ferroelectricity catholyte is PZT. Or the cathode structure which applied
ie ferroelectricity emitter according to claim 3 characterized by being PLZT.
Claim 7] The thickness of the aforementioned ferroelectricity catholyte is 1. MAIKUROMETORU or 100 The cathode
ructure which applied the ferroelectricity emitter according to claim 1 characterized by being a range in
1AIKUROMETORU.
Claim 8] The thickness of the aforementioned ferroelectricity catholyte is 1. MAIKUROMETORU or 100 The cathode
ructure which applied the ferroelectricity emitter according to claim 2 characterized by being a range in
1AIKUROMETORU.
Claim 9] The thickness of the aforementioned ferroelectricity catholyte is 1. MAIKUROMETORU or 100 The cathode
ructure which applied the ferroelectricity emitter according to claim 3 characterized by being a range in
1AIKUROMETORU.
Claim 10] The thickness of the aforementioned ferroelectricity catholyte is 1. The cathode structure which applied the
rroelectricity emitter according to claim 4 characterized by being a range in MAIKUROMETORU or 100
icrometers.
Claim 11] The thickness of the aforementioned ferroelectricity catholyte is 1. The cathode structure which applied the
rroelectricity emitter according to claim 5 characterized by being a range in MAIKUROMETORU or 100
icrometers.
Claim 12] The thickness of the aforementioned ferroelectricity catholyte is 1. The cathode structure which applied the
rroelectricity emitter according to claim 6 characterized by being a range in MAIKUROMETORU or 100
icrometers.
Claim 13] The electron gun characterized by providing the electrode group possessing the electrode of a large number
hich control and accelerate the electron from the cathode structure and the aforementioned source of electron
mission of a publication to the aforementioned claim 1, and the aforementioned source of electron emission and the
pport means which support and fix the aforementioned electrode group.
Claim 14] It is the electron gun according to claim 13 characterized by for the aforementioned drive electrode

nsisting of three drive electrodes, and for each drive electrode having the breakthrough which an electron passes, spectively, and forming the micropore of a large number corresponding to each breakthrough in the part of the orementioned up electrode corresponding to the aforementioned drive electrode.
laim 15] The diameter of the aforementioned breakthrough is 300. Electron gun according to claim 14 characterized being below the micrometer.
laim 16] The material of the aforementioned ferroelectricity catholyte is PZT. Or electron gun according to claim 13 aracterized by being PLZT.
laim 17] The material of the aforementioned ferroelectricity catholyte is PZT. Or electron gun according to claim 14 aracterized by being PLZT.
laim 18] The material of the aforementioned ferroelectricity catholyte is PZT. Or electron gun according to claim 15 aracterized by being PLZT.
laim 19] The thickness of the aforementioned ferroelectricity catholyte is 1. Electron gun according to claim 13 aracterized by being a range in MAIKUROMETORU or 100 micrometers.
laim 20] The thickness of the aforementioned ferroelectricity catholyte is 1. Electron gun according to claim 14 aracterized by being a range in MAIKUROMETORU or 100 micrometers.
laim 21] The thickness of the aforementioned ferroelectricity catholyte is 1. Electron gun according to claim 15 aracterized by being a range in MAIKUROMETORU or 100 micrometers.
laim 22] The thickness of the aforementioned ferroelectricity catholyte is 1. Electron gun according to claim 16 aracterized by being a range in MAIKUROMETORU or 100 micrometers.
laim 23] The thickness of the aforementioned ferroelectricity catholyte is 1. Electron gun according to claim 17 aracterized by being a range in MAIKUROMETORU or 100 micrometers.
laim 24] The thickness of the aforementioned ferroelectricity catholyte is 1. Electron gun according to claim 18 aracterized by being a range in MAIKUROMETORU or 100 micrometers.
laim 25] The cathode-ray tube characterized by providing the source of electron emission given in the orementioned claim 13, the electron gun possessing many electrodes, the funnel possessing the neck section by which is equipped with the aforementioned electron gun, and the panel possessing the screen which realizes a picture with e electron beam from the aforementioned electron gun.
laim 26] It is the cathode-ray tube according to claim 25 characterized by for the aforementioned drive electrode nsisting of three drive electrodes, and for each drive electrode having the breakthrough which an electron passes, spectively, and forming the micropore of a large number corresponding to each breakthrough in the part of the orementioned up electrode corresponding to the aforementioned drive electrode.
laim 27] The diameter of the aforementioned breakthrough is 300. Cathode-ray tube according to claim 26 aracterized by being below MAIKUROMETORU.
laim 28] The material of the aforementioned ferroelectricity catholyte is PZT. Or cathode-ray tube according to aim 25 characterized by being PLZT.
laim 29] The material of the aforementioned ferroelectricity catholyte is PZT. Or cathode-ray tube according to aim 26 characterized by being PLZT.
laim 30] The material of the aforementioned ferroelectricity catholyte is PZT. Or cathode-ray tube according to aim 27 characterized by ****** by PLZT.
laim 31] The thickness of the aforementioned ferroelectricity catholyte is 1. Cathode-ray tube according to claim 25 aracterized by being a range in the micrometer or 100 micrometers.
laim 32] The thickness of the aforementioned ferroelectricity catholyte is 1. Cathode-ray tube according to claim 26 aracterized by being a range in the micrometer or 100 micrometers.
laim 33] The thickness of the aforementioned ferroelectricity catholyte is 1. Cathode-ray tube according to claim 27 aracterized by being a range in the micrometer or 100 micrometers.
laim 34] The thickness of the aforementioned ferroelectricity catholyte is 1. Cathode-ray tube according to claim 28 aracterized by being a range in the micrometer or 100 micrometers.
laim 35] The thickness of the aforementioned ferroelectricity catholyte is 1. Cathode-ray tube according to claim 29 aracterized by being a range in the micrometer or 100 micrometers.
laim 36] The thickness of the aforementioned ferroelectricity catholyte is 1. Cathode-ray tube according to claim 30 haracterized by being a range in the micrometer or 100 micrometers.

[ranslation done.]

NOTICES *

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**** shows the word which can not be translated.
In the drawings, any words are not translated.

ETAILED DESCRIPTION

)etailed Description of the Invention]
(001]
'he technical field to which invention belongs] this invention relates to the electron gun and cathode-ray tube which)plied the cathode structure and this which applied the ferroelectricity emitter which is applied to the electron gun and ıthode-ray tube which applied the cathode structure and this which applied the ferroelectricity emitter, especially uses ferroelectricity emitter as a source of electron emission.
)002]
)escription of the Prior Art] The cathode structure generally used for a cathode-ray tube emits an electron from ıthode matter like Ba oxide excited thermally. Such the cathode structure is equipped with the heat source for heating .e cathode matter, for example, a filament, and is divided into a direct heat type and the radiated type of heat by the :ating method of the cathode matter by the filament.
)003] In order for the thermoelectron emitted from the electron gun to progress to a screen actively and to prevent :gradation of the cathode matter by the ion bombardment, the interior of a cathode-ray tube must maintain the state of high vacuum.
)004] Generally, in the manufacture process of a cathode-ray tube, it passes through a series of manufacture process, ıch as the so-called exhaust air process and an aging process, so that a thermoelectron may be smoothly emitted from ıe cathode matter.
)005] However, in the former, the trouble of the cathode matter deteriorating by the ion bombardment which)nsiderable time generates in process this top was in exhaust air and the aging process.
)006]
'roblem(s) to be Solved by the Invention] It is made in order that this invention may solve the above conventional oubles, and the purpose is in offering the electron gun and cathode-ray tube which applied the cathode structure and ıis to which degradation of the cathode matter by the ion bombardment applied the few ferroelectricity emitter also nder the state of a low vacuum.
)007] Moreover, other purposes of this invention are easy to manufacture, and structure is offering the electron gun nd cathode-ray tube which applied the cathode structure and this which applied the easy ferroelectricity emitter.
)008]
Means for Solving the Problem] In order to attain the aforementioned purpose, the cathode structure by this invention substrate, the lower electrode layer formed on the aforementioned substrate, and the ferroelectricity catholyte formed n the aforementioned lower electrode layer, It is characterized by providing the drive electrode which controls the lectron which is formed on the aforementioned ferroelectricity catholyte, is formed on the up electrode layer which ffers the electron emission field from the front face of a ferroelectricity catholyte, and the aforementioned electrode ıyer, and is emitted from the electron emission field of the aforementioned up electrode layer.
)009] In order to attain the aforementioned purpose, moreover, the electron gun by this invention In the electron gun ossessing the source of electron emission, the electrode group possessing the electrode of a large number which ontrol and accelerate the electron from the aforementioned source of electron emission, and the aforementioned source f electron emission and the support means which support and fix the aforementioned electrode group The :rroelectricity catholyte by which the aforementioned source of electron emission is formed on a substrate, the lower lectrode layer formed on a substrate, and the aforementioned lower electrode layer, It is characterized by providing the rive electrode which controls the electron which is formed on the aforementioned ferroelectricity catholyte, is formed n the up electrode layer which offers the electron emission field from the front face of a ferroelectricity catholyte, and ıe aforementioned electrode layer, and is emitted from the electron emission field of the aforementioned up electrode

yer.
010] In order to attain the aforementioned purpose, moreover, the cathode-ray tube by this invention In the cathode-
y tube possessing the source of electron emission, the electron gun possessing many electrodes, the funnel possessing
e neck section equipped with the aforementioned electron gun, and the panel possessing the screen which realizes a
cture with the electron beam from the aforementioned electron gun The lower electrode layer by which the
oremention source of electron emission is formed on a substrate and the aforementioned substrate, The
rroelectricity catholyte formed on the aforementioned lower electrode layer, and the up electrode layer which is
rmed on the aforementioned ferroelectricity catholyte and offers the electron emission field from the front face of a
rroelectricity catholyte, It is characterized by providing the drive electrode which controls the electron which is
rmed on the aforementioned electrode layer and emitted from the electron emission field of the aforementioned up
ectrode layer.
011] the passage which it is desirable to prepare the three aforementioned electron emission fields and to acquire
ree electron beams for color picture realization in the aforementioned this invention, and an electron passes especially
the aforementioned drive electrode -- it is desirable to prepare a hole
012] Moreover, as a material of the aforementioned ferroelectricity cathode, it is PZT. Or it is desirable to apply any
1 of PLZT(s).
013]
mbodiments of the Invention] Hereafter, based on the drawing which appended this invention, it explains still in
tail.
014] It is 120 when drawing 1 for explaining the fundamental concept of the cathode structure of this invention is
ferred to. It is the ferroelectricity catholyte of the source of electron emission, and is 110. 130 It is a vertical electrode
yer for exciting a ferroelectricity catholyte.
015] Lower electrode layer 110 Up electrode layer 130 When the high-pressure pulse of a sub-microsecond is
pressed, it is the ferroelectricity catholyte 120. It comes to switch spontaneous polarization to the interior and a front
ce, and discharge of a strong electron is caused. Here, an electron is emitted from the outcrop grade in which an up
ectrode is not formed.
016] It is a substrate 100 when drawing 3 which shows the cross section of drawing 2 which shows the rough
rspective diagram of the cathode structure by the materialized this invention, and drawing 2 is referred to. It is the
wer electrode layer 110 of the least significant to a front face. The catholyte 120 which was formed and applied the
rroelectricity emitter on it, the up electrode layer 130, an insulating layer 140, and drive electrode layer 150 It is
rmed one by one.
017] The above cathode structures of structure have three electron emission fields so that it may be used for a color
thode-ray tube. Concretely, it is the aforementioned up electrode layer 130. Lower electrode layer 110 One is
epared at a time, respectively and it is the ferroelectricity catholyte 120. The whole can be excited now.
018] The aforementioned insulating layer 140 Upwards, they are three drive electrode layers 150. A fixed interval is
parated and it is prepared. and each drive electrode layer 150 **** -- breakthrough 151 for electron emission and
ntrol It is formed. Here, it is each aforementioned drive electrode layer 150. Each breakthrough 151 The
oremention corresponding up electrode layer 130 Since the micropore 131 for discharge of a thermoelectron is
rmed in the part as shown in drawing 4 , this is led, and an electron is the aforementioned drive electrode layer 150.
reakthrough 151 It progresses.
019] The aforementioned drive electrode layer 150 Control signals, such as a picture signal, are received, and it
etermines whether emit an electron or not, and the amount of electron emission is controlled.
020] It sets to the cathode structure of this invention of this structure, and is the aforementioned ferroelectricity
atholyte 120. As a material, PZT well-known as the ferroelectric substance, PLZT, etc. are used. Moreover, the
foremention up electrode layer 130 And lower electrode layer 110 As a material, high conductivity metals, such as
luminum, gold, and platinum, are used.
021] Moreover, it is the aforementioned ferroelectricity catholyte 120 as a result of an experiment. The driver voltage
r making a shell electron emit is 100. When it has the low pulse potential below a bolt, it turns out that electron
mission with it happens. [there is little leakage of current and stable] Especially driver voltage is dependent on the
aterial state of a ferroelectricity catholyte, for example, a crystal phase, thickness, etc. of material. According to the
xperiment, it is the voltage of a driving pulse 100 In order to lower to below a bolt, it is the ferroelectricity catholyte
20 130,110, for example, the thickness of PLZT, i.e., a vertical electrode layer. It is necessary to set the interval of a
etween as 10 micrometers or less.
022] Although it becomes lower as the catholyte of driver voltage is thin, since the short circuit between vertical

ectrode layers will occur if it becomes about 1 micrometer or less, you have to become 1 micrometers or more.
loreover, driver voltage is dependent also on the diameter of the breakthrough formed in the size, i.e., drive electrode
yer, of an electron emission field. According to the experiment, it is 300. After carrying out to below
[AIKUROMETORU, it is 100 gradually. Stable electron emission became possible in the state below a bolt.
)023] The manufacture method of the cathode structure of this invention of the above structures is as follows.
)024] Substrate 100 which consists of glass ceramics as shown in drawing 5 After forming a golden paste in a front
ıce in print processes first, only a predetermined time is made to plasticity-ize, and it is the lower electrode layer 110.
obtains.
)025] lower electrode layer 110 PZT pasted as shown in drawing 6 when completed or form PLZT by print processes
y the thickness of 20 micrometers, and pass a plastic process again -- ferroelectricity catholyte 120 It forms.
)026] As shown in drawing 7 , it is the aforementioned ferroelectricity catholyte 120. The laminating of the golden
aste is turned in print processes up, plasticity of this is carried out, and it is the up electrode layer 130. It forms. Under
ıe present circumstances, up electrode layer 130 Pattern 131, i.e., many micropores, as shown in drawing 4 It has.
)027] If an insulating layer 140 and the drive electrode layer 150 are formed using print processes as shown in
rawing 8 , the desired cathode structure will be obtained. Here, it is the aforementioned insulating layer 140. Drive
lectrode layer 150 The aforementioned up electrode layer 130 Micropore 131 It has a corresponding breakthrough.
)028] Moreover, in order to manufacture the cathode structure by this invention, methods other than the print
rocesses mentioned above can also be used. For example, after coating this unilateral side with an electrode layer,
ıolding of this is carried out in acrylic resin, and after polishing other sides by predetermined thickness, it is made to
dhere to a substrate in formation of an electrode layer, after manufacturing a ferroelectricity sheet in the shape of bulk,
ı order to be also able to apply the sputtering method, a doctor blade method, etc. and to form a ferroelectricity
atholyte.
)029] Drawing 9 shows the rough side structure of the electron gun of this invention where the cathode structure of
ıis invention was applied.
)030] This electron gun 900 The cathode structure 190 which had and mentioned the one main lens above, the control
lectrode G1, the screen electrode G2, and focal electrode G3 and an accelerating electrode G4 are located in a line in
rder, and these are the glass beads 800. It is combined with one. 820 It is the aforementioned glass bead 800 about the
athode structure of ********. It is a fixed piece for making it fix, and such a fixed piece can be changed into various
ɔrms.
)031] As mentioned above, the electron gun by this invention has the structure where the radiated type cathode
tructure of the source of thermionic emission of heat was exchanged by the cathode structure of this invention, in the
tructure of a single electron gun of having the single main lens.
)032] For drawing 10 , it is the drawing in which the cathode-ray tube by this invention possessing the electron gun of
ıis invention mentioned above was shown roughly, it sets to the cathode-ray tube of the existing structure, and the
lectron gun of the conventional structure is the electron gun 900 of this invention. It has the structure taken and
eplaced.
0033] Overall structure is an electron gun 900. It is built and is a deflecting yoke 320 to the periphery. Neck 310
ıepared Funnel 300 which it has It is a screen 410 to an inside side. Formed panel 400 Cross coupling is carried out
ınd one vacuum housing is constituted. Screen 410 of the aforementioned panel 400 In the position by which shell
ıredetermined distance isolation was carried out, it is a shadow mask 420. Inside shield 440 It is prepared and these are
ıanels 400. Frame 430 currently fixed It is supported.
0034] Although it came to pass through the exhaust air for optimizing the cathode structure, and the aging process
vhen the assembly of the cathode-ray tube of this invention which has the above structures was completed, in the case
ıf the cathode-ray tube by this invention, exhaust air and the aging process were completed within only 2 hours to
aking about 4 hours in the case of the cathode-ray tube which applied the conventional cathode structure. Moreover,
ıccording to the experiment, the cathode structure was not spoiled even if it lowered the degree of vacuum at the time
ıf exhaust air the single step grade from the conventional cathode-ray tube.
0035]
Effect of the Invention] By applying a ferroelectricity catholyte, exhaust air and an aging process are simplified
echnically, therefore the cathode-ray tube by this invention serves as a low cost. In order not to use a heat source like a
ilament moreover, the cost of parts falls, and thermal deformation of the element which adjoined the cathode structure
ınd this especially by the heat source can be suppressed. Moreover, since the electron emission method is performed by
he momentary pulse, discharge of a thermoelectron is performed quickly.

`ranslation done.]

NOTICES *

This document has been translated by computer. So the translation may not reflect the original precisely.
**** shows the word which can not be translated.
In the drawings, any words are not translated.

ESCRIPTION OF DRAWINGS

ɜrief Description of the Drawings]
)rawing 1] Drawing having shown the cathode structure by this invention roughly.
)rawing 2] The perspective diagram having shown the cathode structure by this invention roughly.
)rawing 3] The cross section of the cathode structure by this invention shown in drawing 2 .
)rawing 4] The up electrode of the cathode structure by this invention shown in drawing 2 is an expansion plan a part.

)rawing 5] Work process drawing of the cathode structure by this invention.
)rawing 6] Work process drawing of the cathode structure by this invention.
)rawing 7] Work process drawing of the cathode structure by this invention.
)rawing 8] Work process drawing of the cathode structure by this invention.
)rawing 9] The outline cross section having shown one example of the electron gun by this invention to which the ıthode structure of this invention was applied.
)rawing 10] The outline cross section of the cathode-ray tube by this invention to which the electron gun of this ıvention was applied.
)escription of Notations]
)0 Substrate
10 Lower Electrode
20 Ferroelectricity Catholyte
30 Up Electrode
31 Micropore
40 Insulating Layer
50 Drive Electrode Layer
51 Breakthrough
90 Cathode Structure
00 Funnel
10 Neck
20 Deflecting Yoke
00 Panel
10 Screen
20 Shadow Mask
30 Frame
40 Inside Shield
00 Glass Bead
20 Fixed Piece
00 Electron Gun
ɟ1 Control electrode
ɟ2 Screen electrode
ɟ3 Focal electrode
ɟ4 Accelerating electrode

Translation done.]